PATENT COOPERATION TREATY

PCT

31 JAN 2005

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 8517/1809	**FOR FURTHER ACTION**	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/IT 03/00420	International filing date *(day/month/year)* 03.07.2003	Priority date *(day/month/year)* 31.07.2002
International Patent Classification (IPC) or both national classification and IPC C07F9/38		
Applicant GIOVANNI BOZZETTO S.P.A. et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 3 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the opinion
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
20.02.2004	26.08.2004
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Boletti-Cremers, K Telephone No. +49 89 2399-8541

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/IT 03/00420

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:

Description, Pages

1-20	as originally filed
5a	filed with telefax on 23.07.2004

Claims, Numbers

1-6	filed with telefax on 23.07.2004

Drawings, Sheets

1/1	as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).

   ☐ the language of publication of the international application (under Rule 48.3(b)).

   ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   ☐ contained in the international application in written form.

   ☐ filed together with the international application in computer readable form.

   ☐ furnished subsequently to this Authority in written form.

   ☐ furnished subsequently to this Authority in computer readable form.

   ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

   ☐ the description, pages:

   ☐ the claims, Nos.:

   ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-6
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-6
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-6
	No:	Claims	

2. Citations and explanations

   see separate sheet

POINT V.

The following documents , quoted in the I.S.R., have been considered as relevant for the examination of the present application . Their numbering will be adhered to for the rest of the procedure.

D1: EP-A-0 479 462.
D2: WO-A-01 79215.
D3: C.A., vol. 132, no. 5, 2000 ; abstract no. 54509, & Zhonguo Fushi Yu Fanghu Xuebao (1999), 19(5), 273-279.
D4: EP-A-0 628 518.
D5: EP-A-0 282 260.
D6: GB-A-2 244 050.
D7: GB-A-1 392 044.
D8: Soviet Inventions Illustrated Section Ch, Week 7941, 21 November 1979 Derwent Publications Ltd.,Class A91,Page 12, AN 75036b & SU-A-643 177.
D9: Tinctoria (1987), 84(3), 57-64 , 1987.
D10: US-A-4 085 134.
D11: US-A-4 187 245.

1. Novelty.

1. In view of the reformulation of the original claimed matter as on file , which now stipulates that one of the R radicals must be different of a methylenephosphonate radical, the claimed matter can be regarded as novel with respect to the D1-D9 documents quoted above.
Since the compounds disclosed in D10 and D11 represent lower homologues of the claimed compounds on file (see examples 14 and 15 of D10 and examples 18 and 19 of D11) in that they possess the n value of 1 instead of the claimed n =2 on file , they are implicitly excluded from the scope of the compound claims on file.

2. Inventiveness.

2.1 In view of the Applicant's argumentation of 23.07.2004, the claimed matter can be regarded as inventive , in that the dimeric and polymeric structures are not suggested by the prior art represented by D10 and D11 in combination or not with the other documents quoted above.

2.2 In view of the restrictions of options 2 and 4 on file , the claimed matter can now be regarded as inventive vis à vis the content of D2 on the basis that it does no longer derive from the teachings of that document.

PAGE 5A

EP-A 479 462 discloses a method for inhibiting the formation of scale in waters having a high barium content by using a high molecular weight phsphonate.

WO 01/79215 discloses N^{α},N^{ω}-dialkyl aminomethylenephosphonic acids and their use in the treatment of water.

Zhongguo Fushi Yu Fanghu Xuebao 1999, 19(5), 273-279 describes the scale inhibition effect of four methylenephosphonic acids.

EP-A 628 518 describes a process of inhibiting oxalate scale formation by polyamino hexamethylene phosphonates.

EP-A 282 260 discloses the inhibition of manganese depositions in water systems by organic aminophosphonic acids.

GB-A 2 244 050 discloses the use of phosphonate metal complex molecules to inhibit the formation of scale in aqueous liquid containing dissolved materials.

GB-A 1 392 044 discloses the synergistic combination of an inorganic nitrite and an organic phosphonic acid as a corrosion inhibitor.

SU-A 643 177 describes poly-N-phosphoryl-oxy-methyl-poly-ethyleneimine used as additive to prevent calcium sulphate deposition in the regeneration of ion-exchange resin.

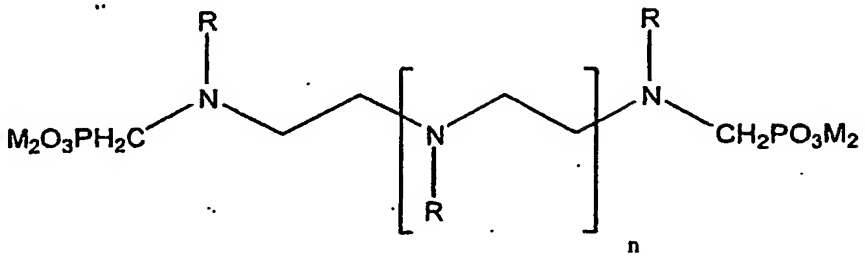
TINCTORIA (1987), 84(3), 57-64 "Prodotti sequestranti in tintura e stampa" describes the use of sequestering agents in dyeing and printing.

US-A 4 085 134 discloses amino-phosphonic-sulfonic acids as scale and corrosion inhibitors.

US-A 4 187 245 discloses hydroxypropylene-amino-phosphonic-sulfonic acids as scale and corrosion inhibitors.

CLAIMS

1) Polyaminomethylenephosphonate derivatives, useful to carry out water treatments, of general formula



wherein n is preferably between 2 and 15000, and each R group, being the same or different, is independently selected from the following classes:

1. $CH_2PO_3M_2$ wherein M may be hydrogen or a suitable cation such as alkali metal or ammonium;
2. CH_2R wherein R = ~~CH_2OH~~; $CHOHCH_3$; $CHOHCH_2Cl$; $CHOHCH_2OH$
3. $(CH_2)_nSO_3M$ wherein n = 3÷4 and M may be hydrogen or a suitable cation such as alkali metal or ammonium;
4. CH_2CH_2R wherein R = $CONH_2$, CHO, $COOR_1$, COOX, CN

wherein R_1 = CH_3÷C_2H_5

X being ~~hydrogen or a suitable cation such as~~ selected from alkali metal or ammonium;

With the proviso that at least one of substituent R always is different from $CH_2PO_3M_2$.

2) Polyaminomethylenephosphonate derivatives according to claim 1 wherein also at least one of the terminal $CH_2PO_3H_2$ mojeties are substitued by one of the mojeties under the above points 1 to 4.

3) Process for the preparation of the polyaminomethylenephosphonate derivative according to claims 1 or 2, comprising phosphonomethylation of polyamine derivatives by means of

Mannich reaction.

4) Use of polyaminomethylenephosphonate derivative according to Claim 2 as scale inhibitors.

5) Use of polyaminomethylenephosphonate derivative according to Claim 2 as sequestring agents.

6) Use of polyaminomethylenephosphonate derivative according to Claim 2 as corrosion inhibitors.